control electronics **114** and a processor included therein. The sorter assembly also may be interfaced fluidically with a cell input mixture **116** and, optionally, a separate fluid source **118**, through a manifold **120** for routing fluid. Furthermore, the sorter assembly may be interfaced optically with a light source **122**. Cells and fluid may be moved from cell input mixture **116** and fluid source **118** by one or more particle/fluid transport mechanisms, such as pressure controllers **124**, **126**, which may apply a negative pressure downstream from sorter assembly **112** and manifold **120**. The pressure controllers and the light source also may be interfaced with the system control electronics, shown at **128**, **130**, to provide, for example, processor-based control of fluid/particle transport and light exposure. Accordingly, light source **122** may be a constant source or a pulsed source, among others.

[**0041**] In operation, cells of input mixture **116** may enter and exit sorter assembly **112** via manifold **120**, before and after sorting, respectively. When the cells exit the sorter assembly and manifold, they may represent enriched populations, such as target cells **132** and waste cells **134**. In various embodiments, the target cells may be re-sorted, cultured, and/or analyzed molecularly or on a cellular level, among others. Waste cells **134** may be discarded. Alternatively, the "waste" cells may be another population of interest to be processed further.

[**0042**] Sorter assembly **112**, also termed a substrate assembly, may include an electrical portion **136** interfaced with a fluidic portion **138**. Electrical portion **136** may include a plurality of thin-film devices **140**, such as switching devices (transistors, diodes, etc.), temperature control devices (heaters, coolers, temperature sensors, etc.), transducers, sensors, etc. Accordingly, electrical portion **136** may be an electronic portion with flexible circuitry. Fluidic portion **138** may define a plurality of sorter channels **142** that create the fluidic aspects of the sorter units.

[**0043**] **FIG. 4** is a partially schematic view of system **110**. System **110** may include a sorter device **150** that includes sorter assembly **112** connected adjacent manifold **120**. Sorter device **150** also may include one or more input reservoirs **152**, **154**, output reservoirs **156**, **158**, and pressure controllers **124**, **126**. The input and output reservoirs may be any suitable vessels or fluid receiver structures. The sorter device also may include system control electronics **114** and light source **122**. Alternatively, the system control electronics, light source, pressure controllers, and/or one or more reservoirs may be separate from the sorter device. For example, sorter device **150** may be configured as a reusable or single-use cartridge that electrically couples through an electrical interface **160** to a control apparatus **162**.

[**0044**] Sorter device **150** may function in system **110** as follows. Cell input mixture **116** and fluid **118** may be may pulled into sorter assembly **112** due to negative pressure exerted by pressure controllers **124**, **126**. The cell mixture and fluid may travel from cell and fluid input reservoirs **152**, **154**, through respective conduits **164**, **166** and manifold **120** into sorter assembly **112**. Without any sorting by the sorter assembly, portions of fluid **118** from fluid input reservoir **154** may pass back through the manifold to be received in target reservoir **156** from conduit **168**. In addition, portions of input mixture **116** may be received in waste reservoir **158** from conduit **170**. However, the action of sorter assembly **112** displaces target cells **132** from mixture **116** so that they are placed selectively in target reservoir **156**.

[**0045**] **FIG. 5** shows a bottom view of selected portions of sorter assembly **112** of sorting device **150**. The sorter assembly may include a substrate **180** having a plurality of thin-film electrical devices **140**. The sorter assembly also may include a plurality of sorter units **182**, delineated here generally as a three-by-three array of dashed boxes. The substrate may define a plurality of openings, such as feed holes **184**, through which fluid and particles may pass, to and/or from the adjacent manifold **120** (see **FIG. 4**). Feed holes **184** may be arranged in columns, shown at **185**. Each column **185** may be aligned with a first-layer manifold conduit, such a conduits **186***a*-**186***e*, which are shown in dashed outline and disposed adjacent an opposing surface of the substrate. Manifold conduits are described in more detail in relation to **FIGS. 7-9**. A fluid barrier that cooperates with the substrate to form channels is disposed adjacent the substrate but is shown elsewhere (see **FIGS. 6 and 7**).

[**0046**] Substrate **180** may have any suitable structure and composition. In some embodiments, the substrate may be generally planar. The substrate may be formed of a semiconductor, such as silicon or gallium arsenide, among others, or of an insulator, such as glass or ceramic. Accordingly, thin-film devices may be fabricated in and/or on a semiconductor, or on an insulator, for example, by flat panel technology. The substrate may provide feed holes **184**, so that the manifold is disposed adjacent a substrate surface that opposes the thin-film devices. Alternatively, feed holes **184** may be defined above the substrate adjacent the same substrate surface as the thin-film devices. Accordingly, a fluid barrier disposed connected to the substrate adjacent the thin-film devices may interface with the manifold (see below).

[**0047**] The sorter assembly may include any suitable number of sorter units in any suitable arrangement. For example, the sorter assembly may include more than ten or more than one-hundred sorter units. In some embodiments, the sorter units may be arranged in a two-dimensional array, which may be rectilinear, among others.

[**0048**] **FIG. 6** shows a sorter unit **182** included in sorter assembly **112**, as the sorter unit sorts cells **132**, **134**. A fluid barrier **196**, shown here in fragmentary sectional view, may be connected to substrate **180** to define the walls of adjacent channels **198**, **200** that receive fluid and/or cells. In particular, channel **198** may receive fluid carrying cells **132**, **134** from first manifold conduit **186***a* and through feed hole **184***a*. The cells may travel along the channel to exit at feed hole **184***b*, which communicates with fourth manifold conduit **186***d*. Channel **200** may receive a fluid from second manifold conduit **186***b* and feed hole **184***c*, shown at **204**. The fluid may travel along channel **200** to exit at hole **184***d*, which communicates with third manifold conduit **186***c*.

[**0049**] Sorter unit **182** may include a sensor **210** and a transport mechanism **212** that is selectively actuated based on information from the sensor. Sensor **210** may be disposed upstream of a passage **214** that connects channels **198**, **200**. The sensor may sense a property of each cell that passes over the sensor. If the property meets a predefined criterion, transport mechanism **212** may be actuated at a suitable time after sensing the cell, for example, based on a predicted arrival time of the cell adjacent passage **214**.

[**0050**] Transport mechanism **212** may include a thin-film electrical device **216** that displaces selected cells from